DESIGN AND CONSTRUCTION OF A LAPTRAY
PRELIMINARY NOTES

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INTRODUCTION

The purpose of this application note is to provide some basic information on the construction of a wheelchair laptray which may be used as a communication board.

A communication board (which is only sometimes a board per se) is composed of two major parts, 1) the physical board, card, tray, etc. and 2) the vocabulary display--the pictures, words, symbols or letters. In this application note, only the physical construction of one type of board (a laptray) will be discussed.

Included in this application note are all the drawings and directions needed to construct a laptray communication board using materials readily available from a local hardware and department store. For simplicity, directions for construction of pre-designed laptray boards are included along with guidelines for customizing laptray board shapes and sizes to accomodate specific children and environments.

For other techniques and for discussions of vocabulary systems for communication boards the reader is referred to the other application notes in this series and to the publications listed in the bibliography available from the Trace Center.

TO USE THIS APPLICATION NOTE

1) Read the "General Notes on Laptray Communication Boards" which follows. It contains some very important guidelines and basics to remember when developing communication boards for a child or adult.

2) Turn to Section I "Design and Construction of the Laptray" and select the laptray most suited to the handicapped person. Then follow procedures on this section for construction of the laptray.

3) Turn to Section II "Wheelchair Mounting for Laptrays" and select one of the two mounting systems for attaching the laptray to the wheelchair.

4) For some of the techniques which have been used to fasten and protect the picture/word/letter lists on the laptray see the application note titled "Positioning and Protecting Materials on a Communication Laptray".

GENERAL INFORMATION ON LAPTRAY COMMUNICATION BOARDS

Be sure to include the occupational therapist, parents, and the handicapped individual on the team.

Occupational therapist, speech and language clinician, teacher, parents, and other professionals working with the child whould be involved in the team to design the laptray communication board. If the child is able to communicate or if the individual is older he should also be integrally involved in the development process.

Within the design effort, the role of the occupational therapist (OT) and/or physical therapist (PT) needs to be stressed. The importance of proper positioning and support to the handicapped child's/adult's ability to control his head, arms, etc.. cannot be overemphasized. It is therefore highly recommended that the development and fitting of the laptray for a child be carried out in close cooperation with the child's OT or seating specialist. In many cases, seating aids may significantly improve the control of more severely handicapped individuals. If the OT is not familiar with laptray communication boards or auxiliary seating aids, he may wish to consult with another professional in this area. A method for allowing the OT to experiment with variations on a laptray is also described to assist in the fitting/design process. (For a further discussion on this topic, see MacDonald, pp. 108-111 in Non-Vocal Communication Techniques and Aids for the Severely Physically Handicapped; Vanderheiden and Grilley eds., 1976.)

NOT JUST ONE COMMUNICATION BOARD

Very seldom (if ever) will one single communication board be able to meet the needs of a handicapped individual. Generally, if the board is large enough to meet his needs in the classroom, it is too large to be portable and can't move with him in the car, at home, at the beach, etc. If the board allows for easy changing, updating or modification of its contents, it is usually not water-resistant or weatherproof. This tends to eliminate use of the board in more adverse situations. The solution to these sometimes contradictory needs is not compromise (i.e., a middle-sized board) but rather multiple aids. Just as we may use more than one form of communication (gestural, written, oral), a handicapped individual may use two or more aids to meet his different needs and to accommodate the different situations/environments in which he lives. Some examples of different types of aids that an individual may need are:

1). A large board which allows for the display of a large and diverse vocabulary to speed communication and to assist the process of interaction in the educational or other settings. Such a board should allow both easy access to the words/pictures, symbols and easy updating of the board items to coincide with current events, lessons, interests.

2). A small, rugged communication board (a mini-board) which can always be with the individual, even at poolside, in the car, and so on. This mini-board may be a direct replication of a part of the child's larger board. To protect it against adverse conditions it could be sealed in plastic (Figure 1). The mini-board could also be used as part of the larger board's display (Figure 2).

3). Special supplementary boards to be used along with his always available miniboard to facilitate communication in specific situations (e.g., eating, classes, discussion of favorite topics, etc.).

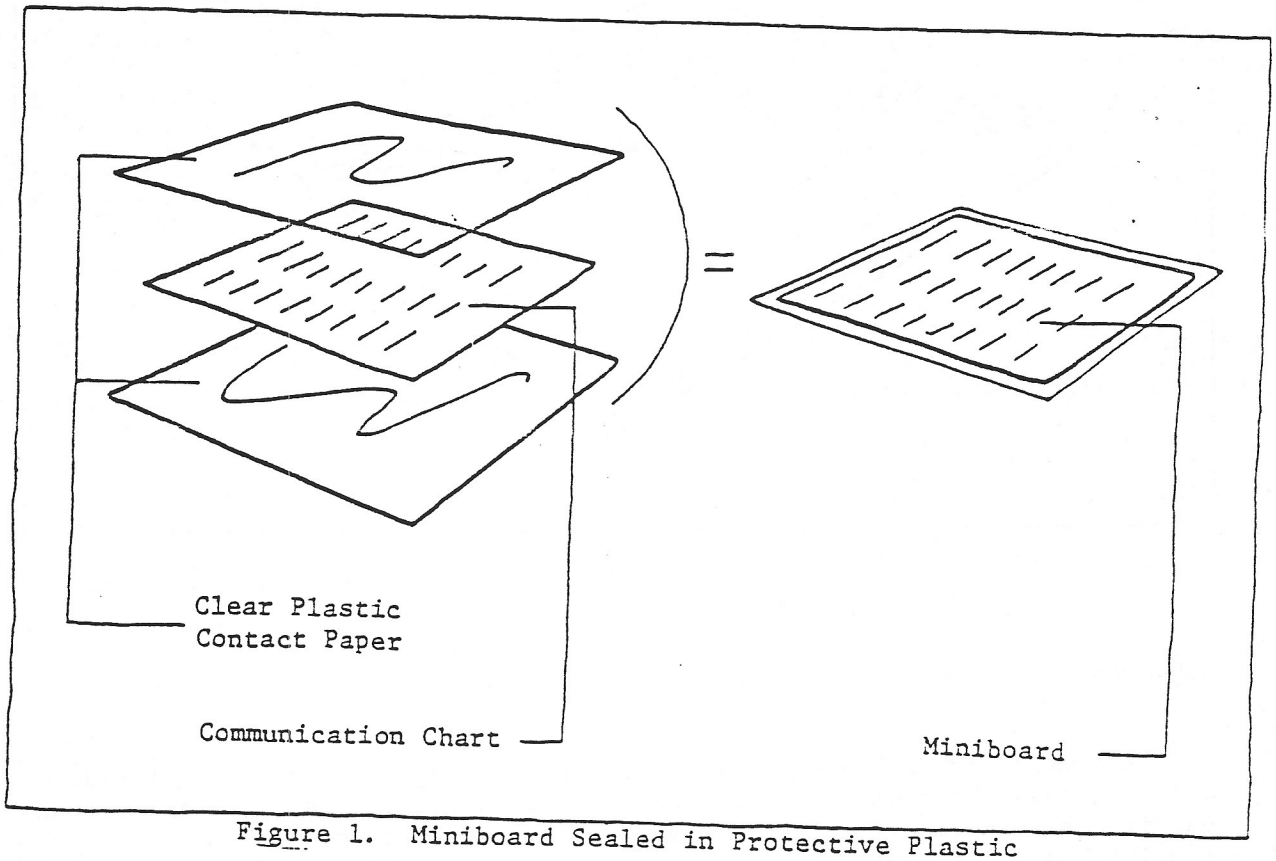


Figure 1. Miniboard Sealed in Protective Plastic

4) A board larger than his always available "mini-board" but which can easily be used on the floor, at home, at play and other places where more rapid or flexible communication would be desired but where the larger laptray would be cumbersome.

Often these different communication boards can be direct copies of each other or parts of each other. Figure 2 shows how a mini-board can be a subset of the larger communication board's display.

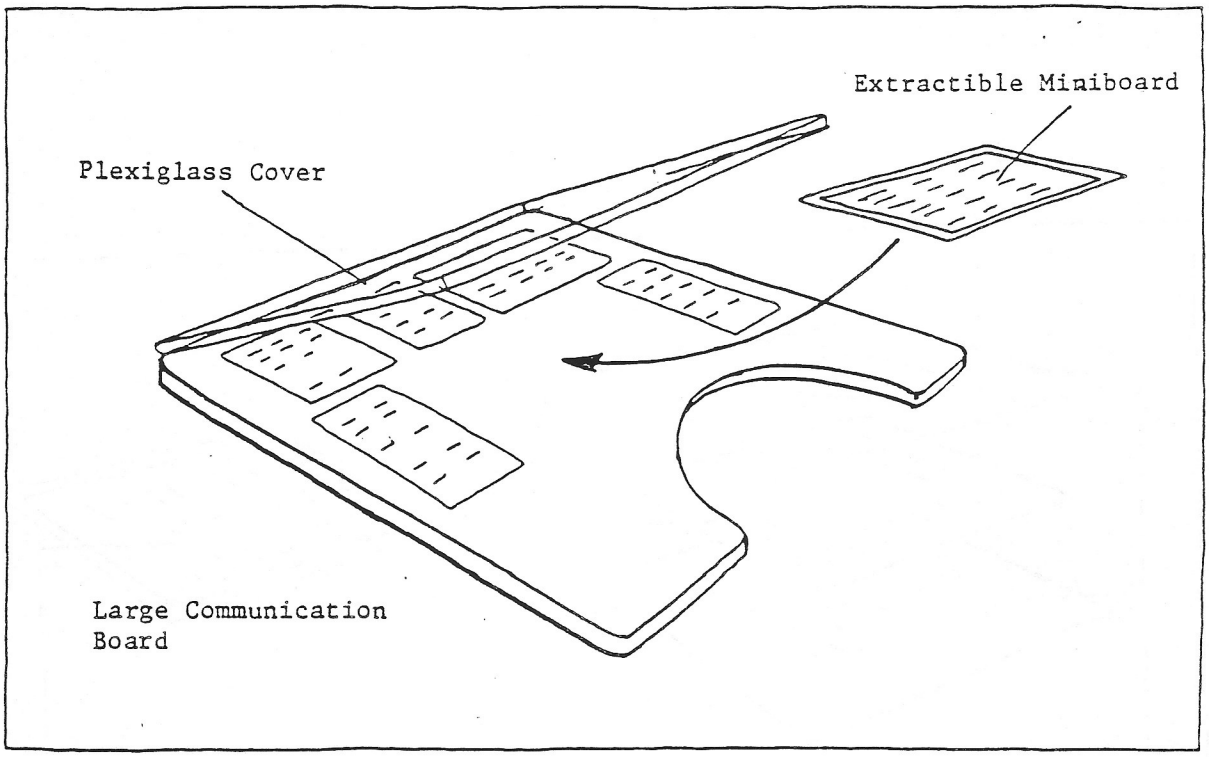


Figure 2. Extractible Miniboard and Large Laptray Board

A COMMUNICATION BOARD IS DYNAMIC, EVER-CHANGING

A communication board should be designed so that it is always flexible and can easily be modified. Sealing a board in plastic may help environmentally but it has a tendency to freeze the board unless it is part of a larger more flexible communication system. There should always be room for additional entries on a communication board. The board should be updated as soon as the available extra area begins to dwindle, so that additional blank area is available for growth. Techniques such as encoding (see reference list at end for more information) may be helpful in this respect. An aid should never reach the point of being full, because at that point the individual loses his freedom (and perhaps some motivation) to expand his vocabulary. Always keep the child's (or adult's) options open for him, and update or enlarge his board before he runs out of room.

SECTION I

DESIGN AND CONSTRUCTION OF THE LAPTRAY

There are basically three factors to be considered in designing/selecting the proper laptray for an individual.

1) The overall size of the laptray

2) The material out of which the laptray is constructed

3) The shape of the laptray

Some considerations and options for each of these factors are discussed separately. General guidelines in fabrication of the laptray top follow.

SIZE

One of the most important considerations in determining the size of a laptray is the effect of the size of the tray on the child's vocabulary. Generally a child's vocabulary is limited by the size of the communication squares that he is physically able to point to and by the number of these squares (or areas) that can fit within the child's range of motion. Unless the child is very small, however, there is the possibility that the child's reach or range of motion may be greater than the size of the laptray. If this is so then the child's vocabulary and communication abilities would be limited not by his skills but by the size of his laptray.

This artificial restriction of the child's communication abilities should be avoided if at all possible. It should be remembered that these children can lean forward and to the side, thus increasing their range of motion. This ability to lean and still retain control of pointing and posture, etc. however, will vary from child to child and will develop over time. When picking the size of the laptray, therefore, it is important to consider not only the current abilities of the child but also those that may develop.

A second consideration on size is the environment in which the laptray will be used. In a school situation where the doors are designed for physically handicapped children, a large laptray may not limit the child's mobility much at all. However, if a laptray is being designed for use at home, it may have to be smaller so that the child can be easily wheeled through normal doorways. Again, it should be remembered that different laptrays and/or mini-boards will probably be desired for the different environments.

A third consideration in the size of a laptray would be any possible interference with the child's own means of mobility. If the child is able to wheel his own wheelchair, you'll have to make some considerations either in the size or shape of the laptray to accommodate the child's arm movements so that he can still wheel his chair. If he has an electric wheelchair with a joystick control, you may either want to mount the joystick control so that the laptray does not block it or you may want to put a hold in the laptray and an extension on the wheelchair control so that the child is still able to operate it even with the laptray in place.

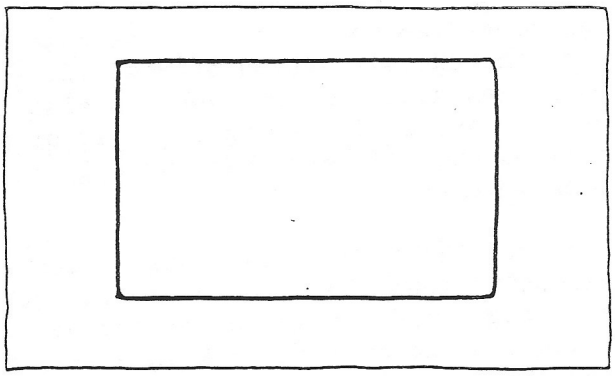


Figure 3. Straight Rectangular Laptray

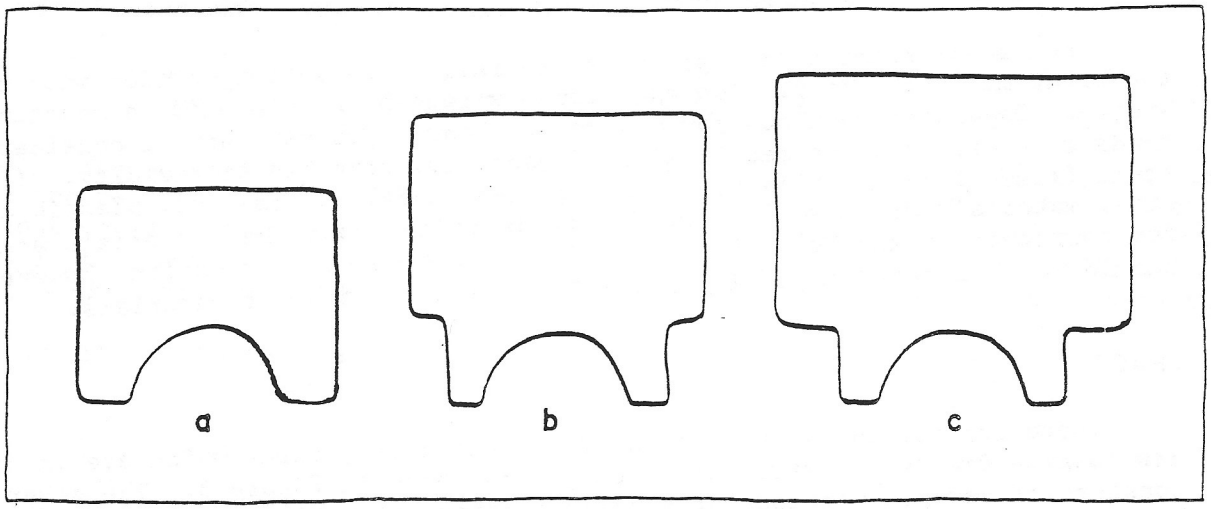


Figure 4. Variety of Armrest/Body Cutout Laptrays

The armrest body cutout laptray can also provide supplementary support to the child in his chair. If the body cutout is designed properly it can provide extra support to help keep a more involved child within a functional posture range. Again, close contact should be maintained with the OT.

Finally, arm extensions can facilitate the mounting of the laptray to the wheelchair. In fact, some mounting systems use the armrests as part of the mounting system. For a more complete discussion of this aspect, see Mounting Systems (Section II of this report).

Whether you use either the rectangular or the armrest laptray design, you'll want to be sure to round all of the corners of the laptray, for the protection of other children as well as the user. If the child is able to move the wheelchair himself by pushing the wheels of the chair, you will also want to make sure that you have sufficient cutouts on the side, (such as in Figure 4B), to allow the child ample access to the wheels.

FABRICATION

For the purpose of this discussion, we will be assuming that the laptray is

being made of plywood. Similar techniques can be used to fabricate laptrays out of the other materials described earlier. Where appropriate, special notations will be made concerning precautions or suggestions for fabricating laptrays with the other materials.

MEASURING THE LAPTRAY

The measurements for a laptray for a particular child are largely dependent upon the size of the overall laptray that you want and the size of the wheelchair to which you are going to mount the laptray. To provide you with flexibility in designing a wheelchair laptray for your child, we will be presenting two different methods for arriving at the measurements. The first method is the simpler of the two; it consists of selecting a standardized size and shape for the laptray and then looking up the measurements on a chart. The second method provides you with a general format which enables you to determine the variables yourself and then allows you to come up with the actual measurements. This approach allows for a more custom fit for the individual but is a somewhat more complicated process than Method A for the laptray builder.

METHOD A

To use this method, simply follow the procedure below. Use the lettered blanks on the right side of Figure 6 to record your calculations.

1) Select (from figure 5) the type of laptray that you want to construct from

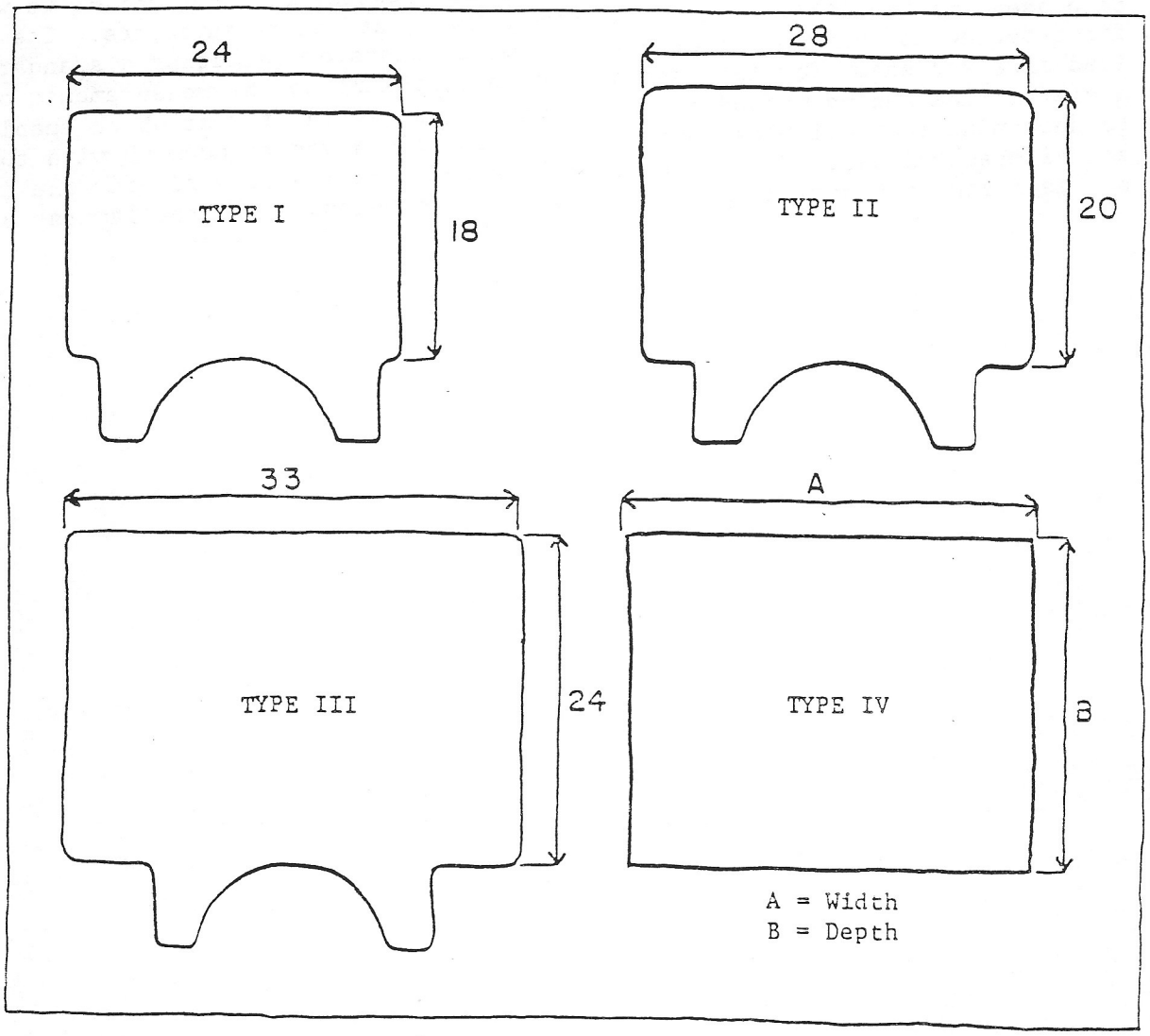


Figure 5. Different Types of Laptrays

2) Measure the inside distance between the arms of the individual's wheelchair. This measurement should be made while the individual is seated in the chair.

3) Refer to Table 1, page 12. Find the section which corresponds to the type of laptray you want. In that section - find the line that corresponds to your measurement of the wheelchair arm distance (see #2). This now will provide the measurements for your laptray design. Copy the numbers from the row onto the appropriate places in Figure 6.

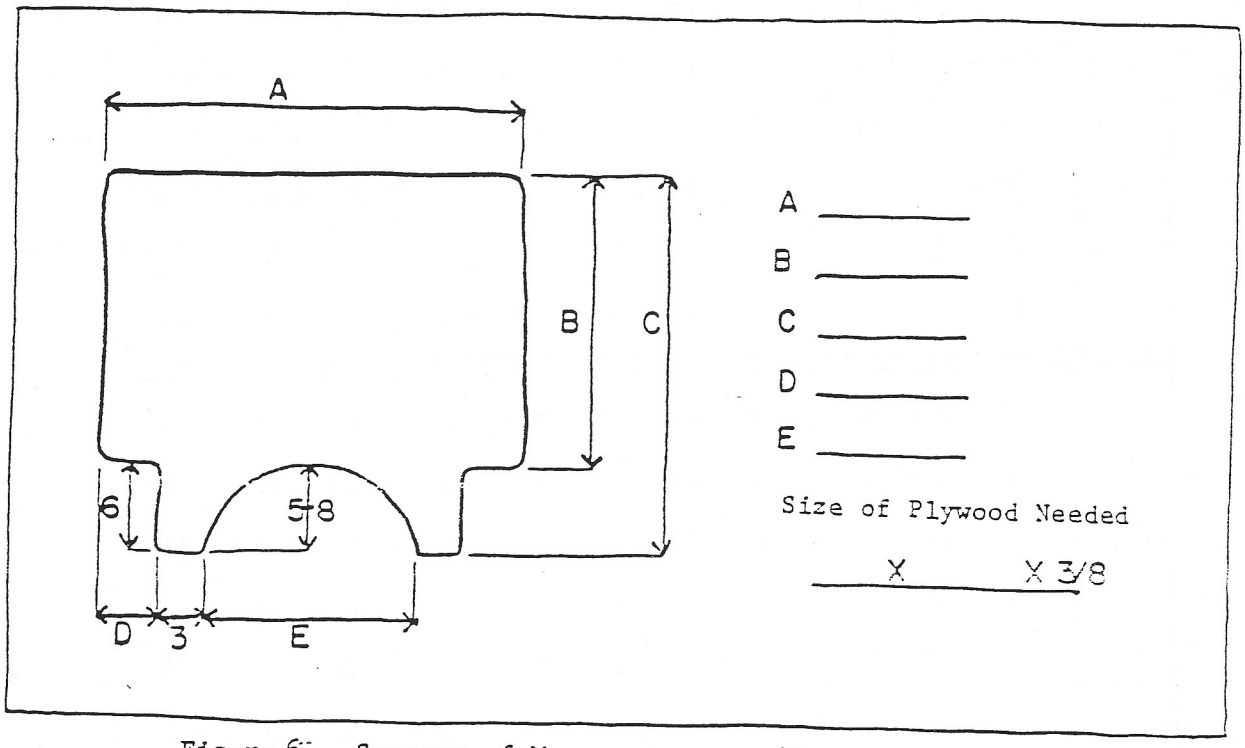


Figure 6. Summary of Measurements (Not to Scale)

EXAMPLE

Your child has a wheelchair with 16" measurement between the arms and you would like to have a Type II laptray. The 16" to 17-7/8" row has the measurements you need. Read across the row and copy the information onto the summary of measurements, Figure 6. Thus, A = 28", B = 20", C = 26", D = 3.5", E = 15".

TABLE I

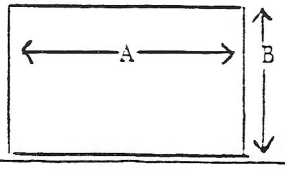
MEASUREMENTS* FOR LAPTRAYS

*all measurements are in inches

TYPE	Distance between arms	A	B	C	D	E	Size of plywood needed
I	12 - 13-7/8	24	18	24	3.5	11	24 x 24 x 3/8
	14 - 15-7/8	24	18	24	2.5	13	24 x 24 x 3/8
	16 - 17-7/8	24	18	24	1.5	15	24 x 24 x 3/8
	18 - 20	24	18	24	.5	17	24 x 24 x 3/8
	20 - 22	24	18	24	-	19	24 x 24 x 3/8
	22 - 24	24	18	24	-	21	24 x 24 x 3/8
II	12 - 13-7/8	28	20	26	5.5	11	28 x 26 x 3/8
	14 - 15-7/8	28	20	26	4.5	13	28 x 26 x 3/8
	16 - 17-7/8	28	20	26	3.5	15	28 x 26 x 3/8
	18 - 20	28	20	26	2.5	17	28 x 26 x 3/8
	20 - 22	28	20	26	1.5	19	28 x 26 x 3/8
	22 - 24	28	20	26	.5	21	28 x 26 x 3/8
III	12 - 13-7/8	33	24	30	7.0	11	33 x 30 x 3/8
	14 - 15-7/8	33	24	30	6.0	13	33 x 30 x 3/8
	16 - 17-7/8	33	24	30	5.0	15	33 x 30 x 3/8
	18 - 20	33	24	30	4.0	17	33 x 30 x 3/8
	20 - 22	33	24	30	3.0	19	33 x 30 x 3/8
	22 - 24	33	24	30	2.0	21	33 x 30 x 3/8

IV

The Type IV laptrays are rectangular in shape. To determine the measurements for your laptray, measure the width and depth of the working area that you want to have in front of the child.



A = width
B = depth

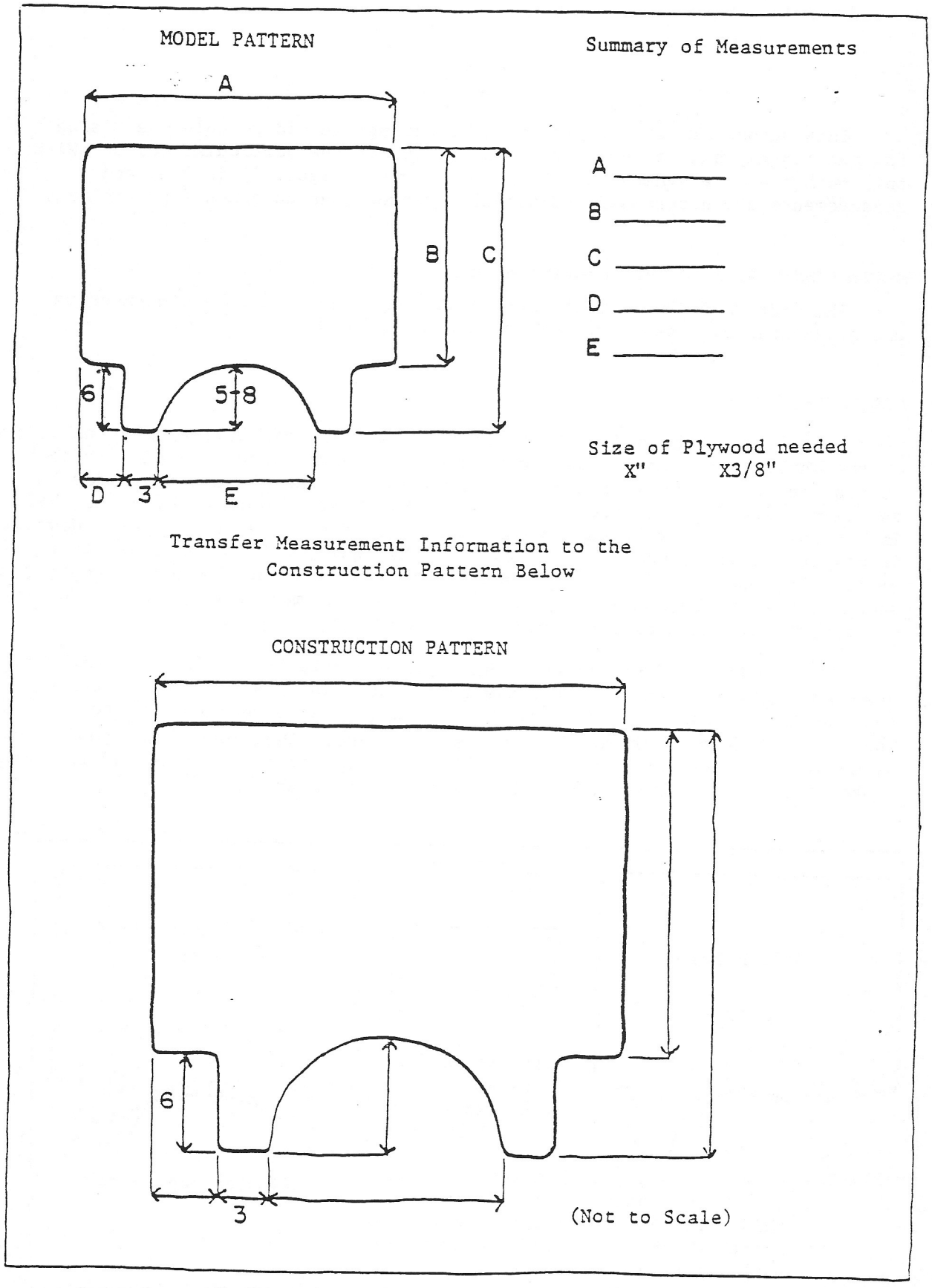


Figure 7. Construction Pattern for Laptray

METHOD B

This method allows the person constructing the aid to select any size for the laptray and to custom fit the cutout for the particular child. With this method a more general construction drawing (Figure 7) is used and measurements are determined individually rather than obtained from a chart.

MEASUREMENTS A, B, C (As referenced in Figure 7)

The width and depth of the actual laptray area should be chosen using the guidelines discussed previously in size, page 5. .

MEASUREMENT D

The size of the body cutout for the child can effect both the stability of the child in his chair and the amount of support which is available to him to stay in an upright position. For this reason, the measurements for "D" should be worked out in cooperation with the PT or OT working with the child. In general, the gap will run somewhere between five to eight inches. However, it may be larger or smaller than this if the individual is particularly heavy or small. In general, if there is a doubt about the size of the body cutout, you should start on the small side (usually 4-5"). If more room is required, you can always cut out additional wood to make the gap longer.

If this is the first laptray which you have fit for a child, it might be useful to make it with an adjustable gap first. In this way, you or the OT and the PT, can work with the child using various size body cutouts to determine what the differences in mobility and support are. Then, once the proper cutout size for a particular child is determined, a laptray can be made for the individual. A sketch of what this might involve is shown in Figure 8.

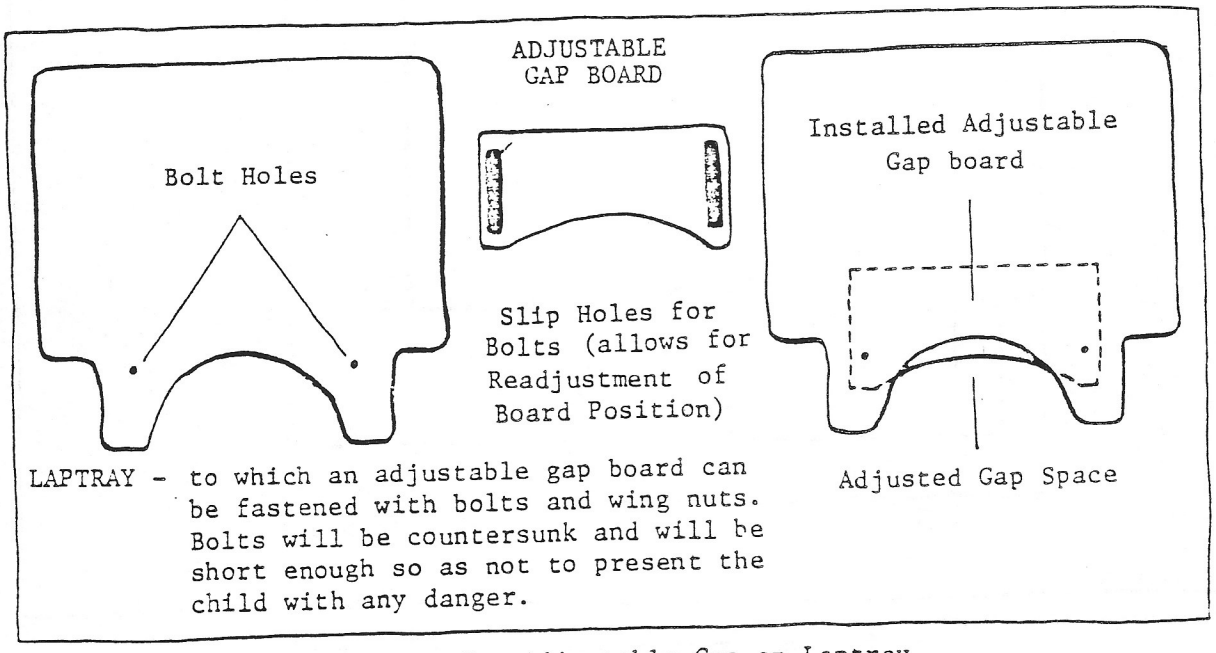


Figure 8. Adjustable Gap on Laptray

MEASUREMENT E

To determine the width of the body cutout, (measurement E) you must first know the inside distance between the arms of the wheelchair to be used. To get this measurement you simply take the distance between the inside of wheelchair arms* and subtract two inches. For example, if the distance between the arms of the wheelchair were 16 inches for a particular child, then the measurement for E would be 16 - 2 or 14 inches.

USING THE MEASUREMENTS

To produce a construction drawing for the laptray, fill in the values for A, B, C, D and E, Figure 7 (or a copy of it). The size of plywood needed will be A x C X 3/8".

*the measurement of the distance between the arms of the wheelchair should be made with the child seated in the chair.

TOOLS

To construct a laptray, you will need:

1) a crosscut saw and a coping saw (Figure 9)

   or a hand jigsaw or sabresaw (Figure 9)

2) sandpaper - medium grain #100-120

3) varnish or polyurethane finish, brush, and paint thinner

4) safety glasses

5) pencil and ruler

6) two C-clamps or woodworking clamps

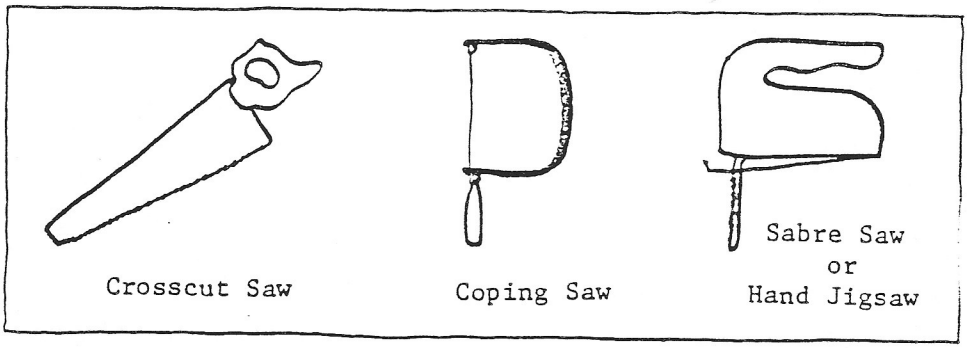


Figure 9. Various Saws Not to scale

CUTTING PROCEDURE

CAUTION: WEAR SAFETY GLASSES AT ALL TIMES

STEP 1. Obtain Correct Rectangular Size for the Laptray

The lumberyard will cut your plywood piece to size at a minimum charge for each cut made. Cutting the piece yourself with a crosscut saw or an electric handsaw will result in some variation from the measurements desired. If you are careful, though, this variation may be small enough not to affect the laptray overall.

STEP 2. Cut Outer Edges and the Body Cutout

Brace or clamp (C-clamp or woodclamp) the plywood to the work area to prevent it from slipping while you are cutting. Then choose the directions below for the particular tools which you will be using.

Copingsaw and Crosscut Saw

Use the coping saw to cut the outer edges. Before you cut the body cutout, you must use the crosscut saw to cut out a notch from this area. This eliminates pressure against the coping saw when you use it to complete the area cutout. See Figure 10 for illustration of this process.

Once this is done, round off the two edges on either side of the body cutout area with the coping saw.

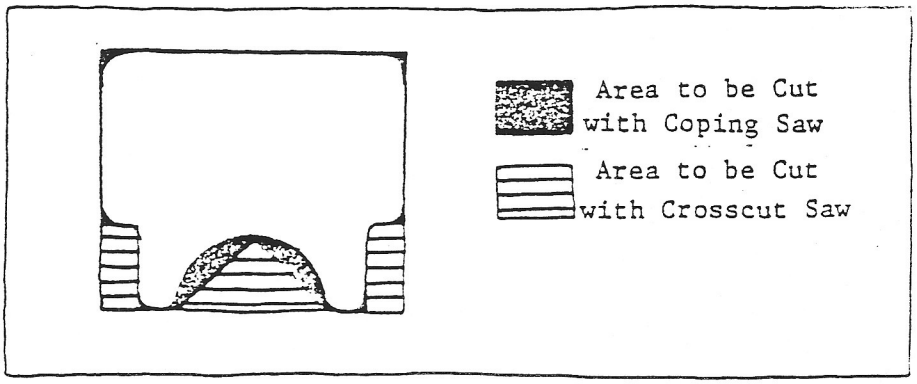


Figure 10. Notch in Body Cutout Area

Hand Jigsaw or Sabresaw

Use either saw for all cuts. Allow the saw enough time to cut - do not push it ahead too fast.

Before you begin to cut the body cutout area, cut a notch from the area. Refer to Figure 10 preceeding this section to see how the notch should be cut out.

Taking the notch out will eliminate pressure otherwise brought to bear against the saw blade. This pressure could break the blade.

STEP 3. Cutout Arm Areas

Brace or clamp the plywood to the work area to prevent it from slipping while you are cutting. Use the coping or electrical saw. If "binding" (i.e. saw sticks or jams) occurs, it may be necessary to notch the area in much the same way as you did in Step 2 for the body cutout area. Round off all corners when you finish the main cutout area.

When you are finished with the rough cutting, the laptray should be tried with the child to check for final adjustments. If the child is able to wheel his own chair it may be desirable to double-check the side cutouts to be sure they allow him proper access to the wheels.

STEP 4. Sand All Cutout Areas

Sand all areas of the plywood which have been cut. Be careful not to run into splinters. When finished, these areas should be smooth enough that you can run your fingers over them without feeling any roughness.

STEP 5. Varnish

Varnish the laptray according to directions on your can of varnish.

SECTION II
WHEELCHAIR MOUNTING FOR LAPTRAYS

There are many methods for mounting laptrays to wheelchairs. The two described here were chosen because they require no modification to the wheelchair itself and can be easily made using parts obtained from hardware or department store and common tools.

MOUNTING A - VELCRO TAPE

This first system is an extremely simple system which can be implemented in about five minutes. It consists of a pair of Velcro straps tacked to the armrest portion of the laptray. To mount the laptray to the wheelchair, the tray is placed on the arms and the straps are looped around the wheelchair and brought back to the top of the laptray where the Velcro overlaps and fastens to itself.

There are several advantages to this simple and low cost system. If the straps are pulled tight, the board is held tight to the arms and generally will not pull forward if someone pulls on the front edge. (If the laptray does slide, a piece of ping pong paddle rubber or other friction material can be glued to the bottom of the armrests). Because the tray is only attached at the back edge, it can be tilted up, which facilitates pointing for some children. This system is not very sensitive to minor changes in wheelchair width and can usually be used on different types of chairs if they are approximately the same sizes. It is also not sensitive to the particular kind or thickness of the armrest on a chair. Lastly, because there are no protrusions from the bottom, the laptray can also be easily used on the table or floor.

Along with the advantages, there are also some disadvantages. The first disadvantage of this system is that it tends to wear out after awhile. With repeated use, the Velcro will begin to loose its grip and will eventually need to be replaced. This replacement can be significantly delayed by being sure to get a good quality, long-life type of Velcro.

The second disadvantage to this approach is that it takes slightly longer to attach to the wheelchair. Although it only involves two flicks of the wrist, this requires more effort than the second mounting approach (see "Mounting B- Wooden Runners") which simply involves sliding the laptray on.

Finally, the tilt-up feature of this board can be a problem at meal time. A good rap on the bottom of the board by the child's knee could send dishes and their contents into the air. If this is a problem, an extra strap or hook could be put on the front of the aid to keep it from tilting up.

MATERIALS NEEDED

The materials needed for this system are:

1) 2-12" strips of Velcro "loop" material

2) 2- 4" strips of Velcro "hook" material

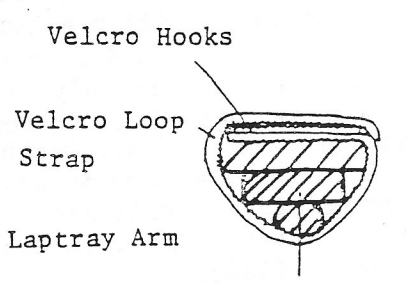
3) 10 small tacks

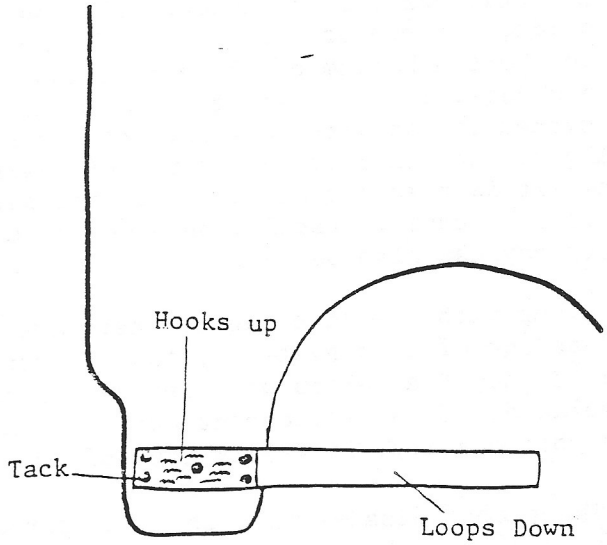
4) 1 tack hammer

To use this system, the laptray should have armrests about 3" or so in width which are centered over the wheelchair arms.

CONSTRUCTION

To assemble the mounting system put one 2-1/2" strip of Velcro loop material (loops down) on the armrest of the laptray. One end should be on the tray's armrest with the rest hanging into the cutout (Figure 11-A).





a. Place velcro loop strip face down on laptray arm. Place velcro hooks face up on loop strip. Drive in tacks - keep corner tacks very near the corners

b. To mount laptray simply set on wheelchair, wrap velcro strap around arm and press end of loop strap onto hooks

Figure 11. Wheelchair Mounting A - Velcro Tape

Now place a 2-1/2" strip of Velcro hook material (hooks up) on top of the other Velcro strip. You should now have two strips of Velcro, back-to-back on the arm with the bottom one sticking out (loops down). The top piece should have the hooks up. Now pound a tack into each corner of the small strip of Velcro as well as one tack in the center (Figure 11-A). Now repeat for the other side. When finished, the two Velcro straps should both hang down in the middle of the cutout.

To mount the laptray to the wheelchair, simply wrap the strap around the arm and press it down on the Velcro hooks (Figure 11-B). If the strap is too long, it can be cut back, but be careful. If it is cut too short, the Velcro hooks will be exposed and may catch in clothing or irritate the child's arm. A helpful hint from veteran Velcro users is to cut the loops off of the last 1/4" or so of the long straps or to put a 1/4" strip of hooks over them. This gives you something to grip when trying to pull the Velcro loose to remove the tray.

MOUNTING B - WOODEN RUNNERS

The second mounting system consists of two wooden runners on the bottom of the laptray which slide around the wheelchair arms. The laptray is mounted on the wheelchair by simply sliding it on.

The advantages of this system are chiefly its convenience and durability. Mounting is a simple one motion effort. The system is also very rugged and has no components which wear out. There is also no problem with the tray flipping up if struck from below with a knee.

The major disadvantage of this mounting is that it is more sensitive to variations in wheelchair arm separation and thickness. By making the system a bit loose, some of this can be reduced. However, if there is a significant difference in wheelchair arm separation and thickness, there may be some problem. A second disadvantage of this mounting system is that the board tends to slide off as easily as it slides on. If the child moves around a lot in his chair, or if others pull on the laptray to move the board, a problem may arise. It can be solved by any of these three simple methods:

1) put a strap around the back of the chair which connects on either side of the laptray

2) put a smaller strap on one side of the laptray which goes around just one of the backposts

3) set up a "hook and eye" arrangement at the back of the chair - the laptray would have a strap with a "hook" and the back of the chair would have the "eye". This arrangement could be on one or both sides of the wheelchair. Figure 12.

Another disadvantage of this approach is that the wooden tracks protrude from the bottom and make it less convenient to use on a table top or the floor. Finally, this system may not be compatible with power wheelchairs.

MATERIALS NEEDED

For the wooden runner laptray mounting system, you will need:

- two boards 12" x 1-1/2" x 1-1/2" (for 1" thick arms)
- two plywood pieces 12" x 2-1/4" x 3/8"
- four flathead bolts 2-1/4" x 1/4"
- four washers
- four nuts
- 2 C-clamps (or wood clamps)
- one 3/8" drill bit for hand or electrical drill
- one adjustable wrench or pair of plyers

For this mounting system, the laptray need not have armrests cut out. If there are no armrests, however, the laptray must be prevented from possible movement back too far against the child. Blocks should be bolted to the bottom of the tray in front of the wheelchair arm. Care should be taken to position the tray properly for the child's use before the blocks are installed.

If protection against the tray sliding forward or being pulled off is desired, you will also need the following materials: (See Figure 12).

a) two hooks (dog leash style), two eyes and a strap. (determine strap length after you choose one of the designs in Figure 12)

or b) a simple "hook and eye". Use a bolt-type hook.

CONSTRUCTION

For convenience, the following procedure can be used for constructing/ positioning the wooden runners on the laptray. (Refer to Figure 13).

1) Measure the distance between the outside edges of the wheelchair arms (Figure 13-A). Be sure the child is seated normally in the chair

2) Add 1/2" to this measurement(s) and call it "B"

3) Place the two smaller pieces of wood on the laptray as shown in Figure 13-B

4) Place the flat boards (plywood) on top as shown in Figure 13-C

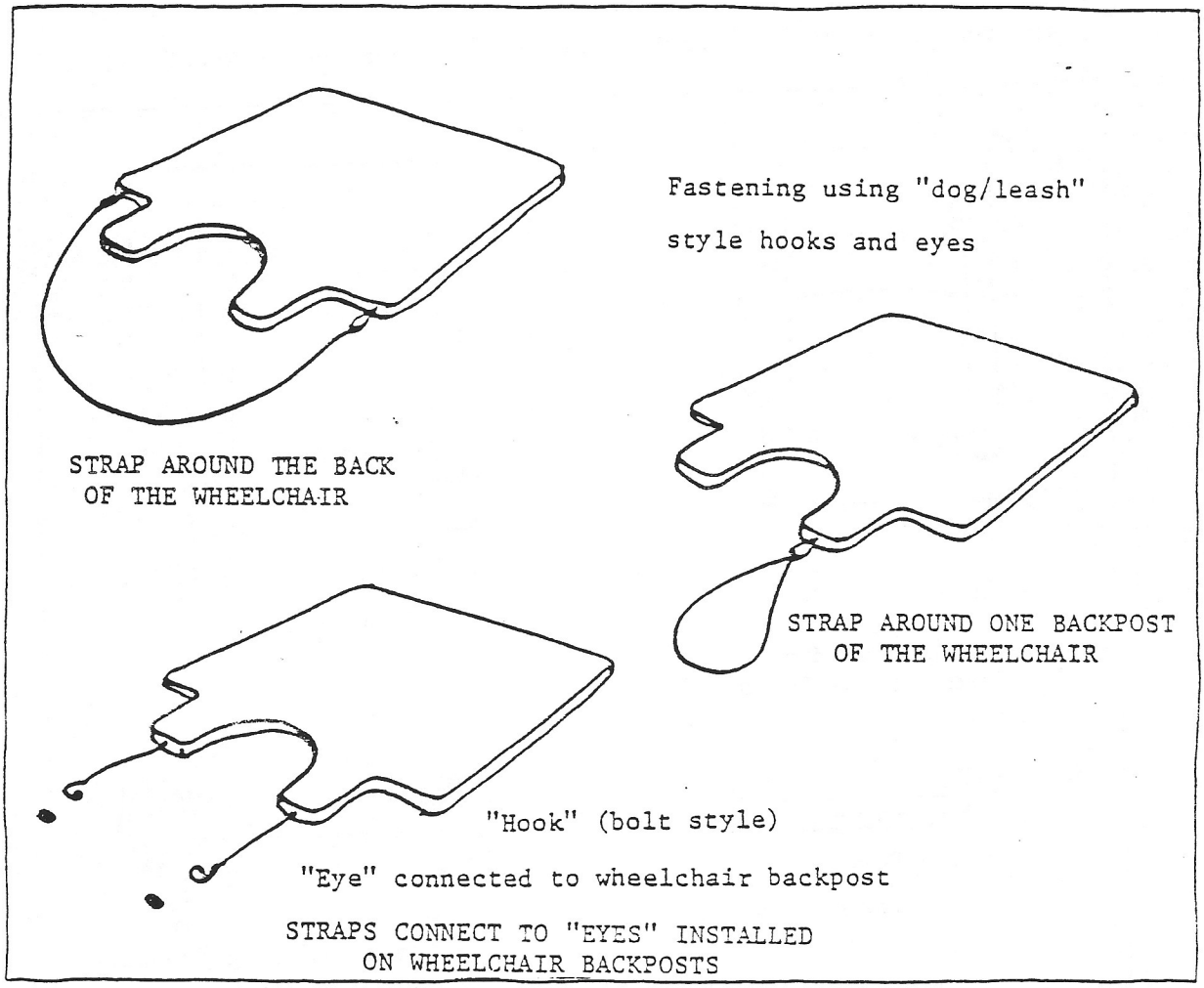


Figure 12. Various Strap Designs for Stability of Wooden Track Mounting of Laptray on a Wheelchair.

5) Check to be sure that the distance "C" (Figure 13-C) is equal to the thickness of the wheelchair arm plus 1/8".

6) Clamp these pieces of wood to the laptray. Recheck your measurements ("B" and "C") for accuracy. (See Figure 13-D)

7) Drill two 3/8" holes through the properly positioned pieces and the laptray as shown in Figure 13-E). Drill slowly to avoid splintering laptray top when the drill breaks through.

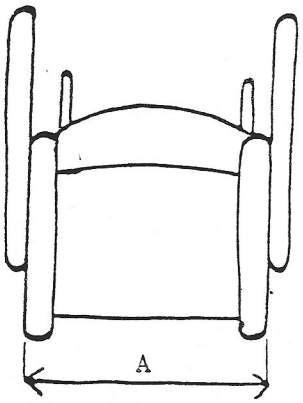
8) Insert the bolts and pull them through the holes. Put nuts onto ends of bolt and tighten down until bolt head is even with surface (flush with top). (Figure 13-E)

When the aid is completed, sand and round all edges. Coat with polyurethane or other suitable finish.

Figure 13.

Construction of Wooden Runners for Laptray Mounting on Wheelchair

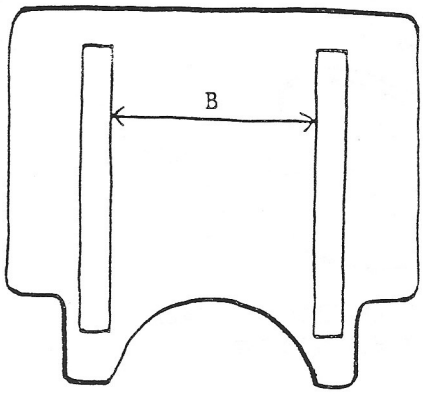
A



(A + 1/2" = B)

Wheelchair Arm Measurement
from Outside Edges

B

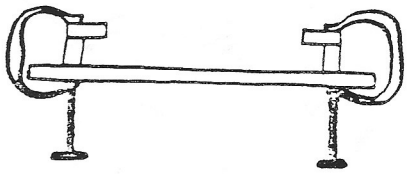


Bottom View of Laptray
with "Runners" Positioned

C

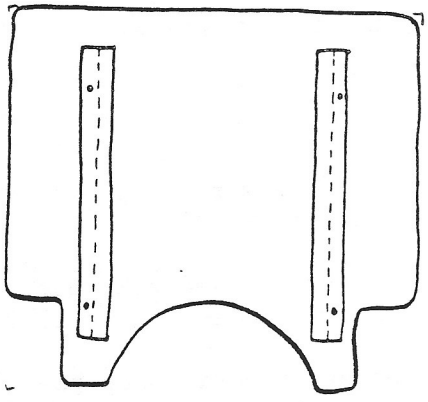
Upside Down,
Front View of Laptray

D



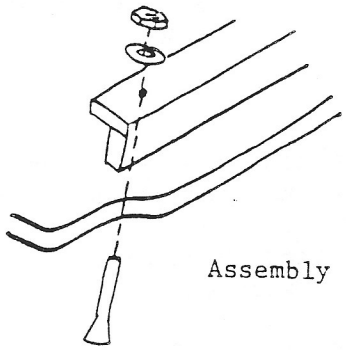
C - Clamps Holding "Runners"
in Place for Drilling Process

E



Drill Holes

F



Assembly

A = Distance Between Outside Edges of Wheelchair Arms.

B = (A + 1/2") Distance Between Two "Runners" Positioned on the Underside of the Laptray.

C = Distance from Underside of Laptray to Underside of Runner (this Distance Must Be Equal to the Thickness of the Wheelchair Arm Plus 1/8")

APPENDIX A

Commercially Available Laptrays

COMMERCIALLY AV. LABLE LAPTRAYS

COMPANY/ADDRESS	MODEL NAME/#	Dimensions W x D x weight	MATERIAL	COST (Shipping)	MOUNTING
E. F. Brewer Company 13901 Main Street Menomonee Falls, WI 53051	Bed Desk Model 83665				
Theradyne Corporation Jordan, Minnesota 55352	Utility Tray	Adult Slim Child		34.00 + 2-75	
J. A. Preston 71 Fifth Avenue New York, New York 10003	P.C. 583 Wheelchair tray	21 18	Molded plaster	39.95 Total 6-75	
	P.C. 7070G Utility tray with rim		Formica top	30.30 Total 6-75	
Nelson 5690 Sarah Avenue Sarasota, Florida 33581	Wheelchair Tray 6080	24 19		19.95 1.25 21.20 Total 1976-77	
G. E. Miller, Inc 484 S. Broadway Yonkers, N.Y. 10705	Adjusto Tray with rim. G.J. 4446			43.00 catalog 95	
	Wheelchair tray GJ4476			23.50 catalog 95	
Gendron-Diemer, Inc. Lugbill Road Archbold, Ohio 43502	No. 91 Tray				
Erie City Mfg. Co. Inc. 1030 West 12th St. Erie, PA 16501	Utility Tray	23 1/2 15			
Everest & Jennings 1803 Pontius Ave. Los Angeles, CA 90025	Adjusto Tray #2044 KNG (for posture 90 chair)			39.00	
	2045 AT for Full length			43.00	

	2045 AT-26 Desk length					43.00	
	2045 AT-R restraining for 200 & 250 arm models					53.00 10-74 price list 174	
CLEO Living Aids 3957 Mayfield Road Cleveland, Ohio 44121	G3934 Cleo Lap Board				Formica Top Friction Material		
	C-3935 Plexiglas lap Board				Plexiglas		
	C-3936 CLEO Adjustable Wheelchair Tray						
	C-3937 Universal Wheelchair Tray						
MED - AAMED Inc. 1215 South Harlem Forest Park, Illinois 60130	MED Wheelchair Tray MO1-3244 child size				Plastic laminate top with wood rim	29.50 5/74	
	MO1-3245 adult					32.00 Bulletin #5 5/74	
	MO1-3243 Posture 90 Child						
	MO1-3242 wheelchair tray						
Rolls Divisions of Invacare Corp. Elyria OH 44035 Long Beach, CA 90813	#1300 Utility tray	21	18		Molded Plastic		

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